AUTOMATIC VECHICLE DETECTION SYSTEM

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A report submitted in partial fulfillment of the
requirements for the award of the degree of
Bachelor of Electrical Engineering (Electronics)

Faculty of Electrical & Electronic Engineering
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NOVEMBER 2007

"I hereby acknowledge that the scope and quality of this thesis is qualified for the award of the Bachelor's Degree of Electrical Engineering (Electronics)"

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In the Name of Allah, the Most Beneficent, the Most Merciful

Special Dedication of This Great Moment to My Family
(for encouraged me in studies)
My friends, my fellow colleague
My supervisor and academic advisor
and for all those who support me in this project

"Wisdom is the most powerful"

Sincerely
Syahrul Nizam

ACKNOWLEDGEMENT

In the name of Allah S.W.T. the Most Gracious, the Most Merciful. Praise is to Allah, Lord of the Universe and Peace and Prayers be upon His final Prophet and Messenger, Muhammad S.A.W.

I would like to take this opportunity to sincerely express my highest gratitude to my supervisor, Mrs. Nurulfadzilah bt. Hassan for her guidance, ideas, advices and time during this project fulfillment. Without them, this project could not be done successfully.

My sincerely gratitude also goes to my friends for their advices, ideas and aids, especially Mohd Fadli bin Sapi'in and whose involve directly and indirectly in this project.

Lastly but not least, my specially thank to my parents, Mr. Zaini bin Osaman and Madam Hamidah bt. Hj. Hassan and my lovely brothers who had given me moral supports and always pray for my future undertakings.

ABSTRACT

This project is based on webcam, Graphical User Interface (GUI), the relationship of each part for image processing and server client connection. This system is designed to automatically & remotely determine whether parking is empty or full. The monitoring system is written using Microsoft Visual Basic Version 6 language. Edge detection is used to image reduces significantly the amount of data and filters out information that may be regarded as less relevant, preserving the important structural properties of an image. The captured image that will be compared to the default image to see the outcome if image either full or empty. This is one of image processing part that called differences. This concept cans different two images and then analysis it using Correlation coefficient concept. The data will be updated on the server that sends information on the availability of a parking space to client using internet connection. The data will be updated based on feedback of output parking system or if a client asked for the information.

ABSTRAK

Projek ini melibatkan kamera web, setiap bahagian dalam pemprosesan gambar, talian antara dengan penguna dengan pembuat servis (server) dan Antaramuka Paparan Grafik.Sistem ini direka untuk beroperasi secara automatik dan terkawal untuk mengetahui kawasan letak kereta penuh atau kosong. Sistem ini dibangunkan dengan penulisan teknologi Visual Basic versi 6.0. Konsep pengesanan sudut digunakan untuk pengurangan gambar secara bersesuaian dengan jumlah bit dalam gambar itu dengan menapis informasi yang kurang sesuai dan mengekalkan struktur gambar yang penting. Gambar yang ditangkap akan dibezakan dengan gambar asal untuk mengetahui sama ada parkir penuh atau sebaliknya. Ini salah satu konsep dalam pemprosesan gambar yang dikenali Pembezaan. Konsep ini digunakan untuk membezakan dua gambar dan analisis dengan kiraan secara konsep ”Correlation coefficient”. Data akan diperbaharui di pembuat servis (server) yang akan menghantar informasi kepada pengguna mengenai kekosongan di tempat letak kereta secara talian internet. Data juga akan diperbaharui mengikut informasi dari keluaran maklumat dari sistem atau pertanyaan dari pengguna yang inginkan maklumat baru situasi kawasan letak kereta.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Nowadays, parking system is an important industrial in development country. It have many problem occurs because of a not systematic and services that produces by parking management. However, this project is one of a solution how to reduce and control parking system to become more systematic and smart.

The Automatic Vehicle Detection System is proposed to analyze parking condition, and relay information back to user. The main part of this system is an image database and graphical user interface.

The detecting system applies the analysis data and then calculates the image based on correlation coefficient concept to determine either parking if full or not. Based on the test result, the proposed system is capable of detecting and show the condition of parking system to users via internet. It is more practical and suitable with this new era of technology.

1.2 Problem statement

Currently parking management required to manually record all situation data in parking system by alert if client comment parking is full after and then put a board that say “Parking Full”. In this case client will frustrate when several problems are occur. It will give a negative feedback from client to the management.

A systematic requirement is required to solve this problem. The Automatic Vehicle Detection System is proposed to analyze parking condition remotely and relay information about available parking space back to user.

1.3 Objectives

The objective of this project is to develop a parking system that has:

i. Access control management to make system integrate between server and client smoothly.
ii. To determine whether or not a parking contains a car by using edge detection
iii. To alert users of available parking lot/space.

1.4 Scope of Project

The software will be created by using Visual Basic 6.0. What we can get from this project is the application of the project where by developing this software we will be able process the image. This will make us more understand more about image processing as we know that there is variety of application image processing.

This system also had been developed based on parking system requirement. It is important to make sure the system developed will meets their requirement. The system will only focus on the image captured using a webcam, enchantment image to edge detection and produce analysis based on comparison data. There will be two users who will use this system. It is the administrator and client. Client used it to acknowledge the parking situation via internet. While administrator is specialize to give information either parking if full or available.

1.5 Methodology

Figure 1.1 show the flow chart of the system design for this project where the first step is literature review. This part is the most important step before doing any project to give some information about the project. For this project, the information gathered from surfing internet, books and writing materials and a brief discussion with supervisor and an expert. From this literature review, we will know about the software that need for this project.

After getting all of the information about the project, the next step is to design and develop automatic vehicle detection system. For this project we need to analyze parking condition remotely, and relay information about available parking space back to user.

The last step is integrate both of the system and test whether the system archive the goal or not and make an analysis of the project result.

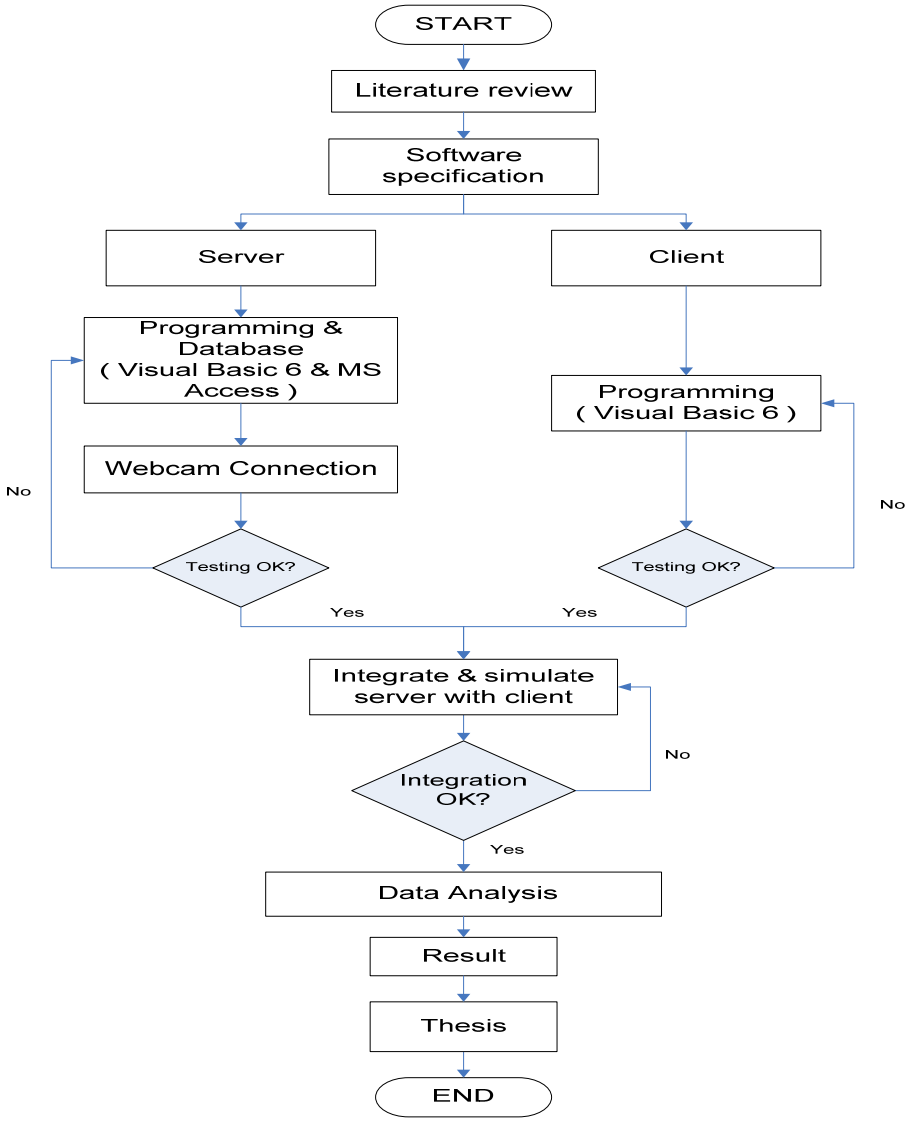

Figure 1.1 Flow Chart Progresses of PSM1 and PSM2

1.6 Thesis Outline

The thesis is organized as follows:

Chapter 1: This chapter explained about project background, objective, scope, methodology and also the problem statement.

Chapter 2: Describe about webcam, server, data acquisition and the relationship of each part for image processing

Chapter 3: Discuss a detail of the design for Automatic Vehicle Detection System. Meanwhile, represent the main part of the project, edge detection.

Chapter 4: Describe about the experimental results and include two part which are server page and client page

Chapter 5: presents the overall conclusion for this thesis and a few suggestion and recommendation for future work.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter explains the background of webcam, server and the relationship of each part for image processing. This chapter also explains the overview of image processing for automatic vehicle detection system project. In this chapter, overview everything based on literature review about all concept including in this project.

2.2 Data Acquisition

Data acquisition is the sampling of the real world to generate data that can be manipulated by a computer. Sometimes abbreviated DAQ or DAS, data acquisition typically involves acquisition of signals and waveforms and processing the signals to obtain desired information [J. Maps, Jul 1993].

Acquired data is displayed, analyzed, and stored on a computer, either using vendor supplied software, or custom displays and control can be developed using various text-based programming languages such as BASIC, C, Fortran, Java, Lisp, Pascal. LabVIEW offers a graphical programming environment optimized for data acquisition. MATLAB provides a programming language but also built-in graphical tools and libraries for data acquisition and analysis [Charles, 1990].

2.3.3.1 Webcam

Started in 1991, the first webcam was pointed at the Trojan room coffee pot in the computer science department of Cambridge University. This webcam is now defunct, as it was finally switched off on August 22, 2001. The final image captured by the camera can still be viewed at the webcam's homepage [Oliver, 2004].

Webcams connected to PCs can act as web-accessible cameras with certain software; the software uploads pictures to a server, from which can produce an input to system. Usually, this kind of software is programmed to work with almost every webcam. This software can be configured in many ways, and will often include options for image size and quality, overlaying logos, and time stamping images.

In this project, the webcam is eye of this system to capture a picture on parking park and sends back to system to analysis it. The webcam will capture an image after 30 second that set in system. The image will save in bitmap file. The webcam use in this system is shown in Figure 2.1.

Figure 2.1 Webcam

2.4 Image Processing

Image processing is any form of information processing for which the input is an image, such as photographs or frames of video; the output is not necessarily an image, but can be for instance a set of features of the image. Most image-processing techniques involve treating the image as a two-dimensional signal and applying standard signal-processing techniques

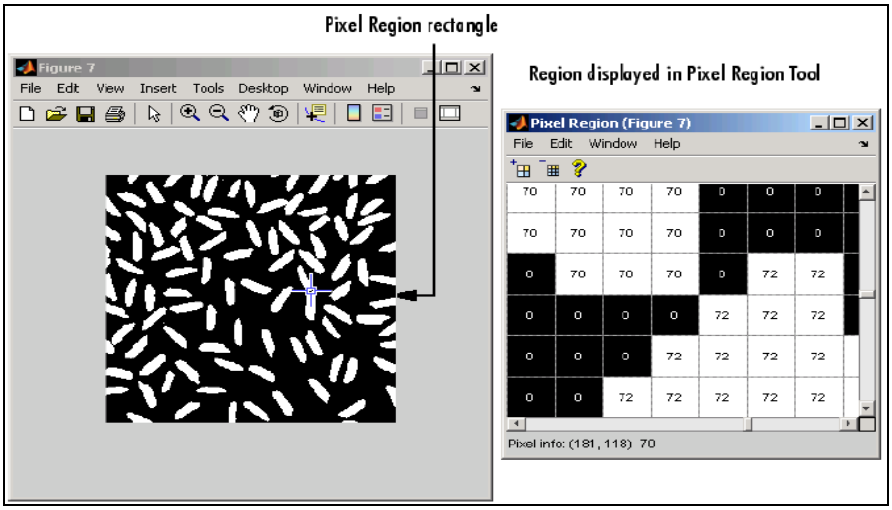

Figure 2.2 Image Processing

An image defined in the "real world" is considered to be a function of two real variables, for example, $a(x,y)$ with a as the amplitude (e.g. brightness) of the image at the *real* coordinate position (x,y). An image may be considered to contain sub-images sometimes referred to as *regions-of-interest*, *ROIs*, or simply *regions*. This concept reflects the fact that images frequently contain collections of objects each of which can be the basis for a region. Figure 2.2(a) show the pixel on image that converts in dot matrix. In a sophisticated image processing system it should be possible to apply specific image processing operations to selected regions. Thus one part of an image (region) might be processed to suppress motion blur while another part might be processed to improve color rendition [Young, 1995].

The amplitudes of a given image will almost always be either real numbers or integer numbers. Figure 2.3 show that pixel value in a binary image. The latter is usually a result of a quantization process that converts a continuous range (say, between 0 and 100%) to a discrete number of levels. In certain image-forming processes, however, the signal may involve photon counting which implies that the amplitude would be inherently quantized. In other image forming procedures, such as magnetic resonance imaging, the direct physical measurement yields a complex number in the form of a real magnitude and a real phase [Scott, 2005].

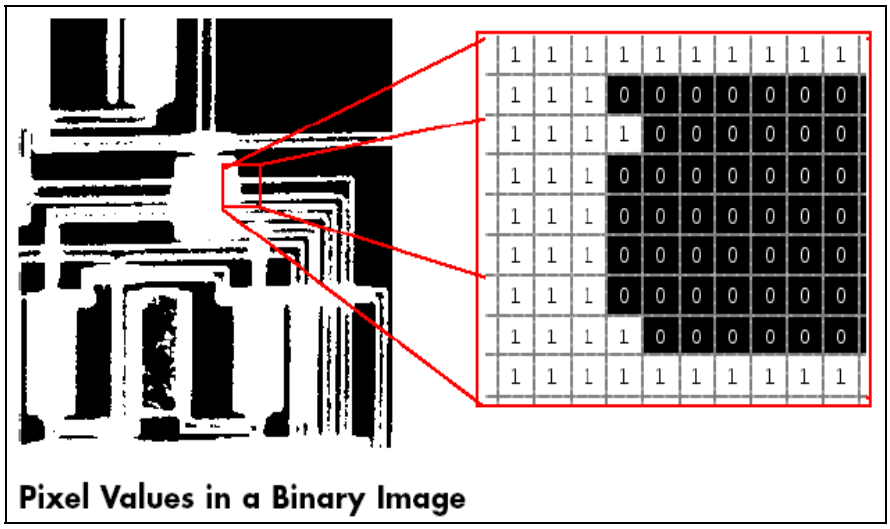

Figure 2.3 Pixel values in a binary image

In image processing, must consider the amplitudes as real's or integers unless otherwise indicated. Visual Basic, the visual-development environment that prefer to work in, often falls short in supporting these requirements, particularly when it comes to fast image plotting. However, it is possible to achieve efficient image processing by improving disk access and image plotting speeds using the techniques.